WALL PROTOTYPES

TRUSS

COMBINATION DESIGN

HEXAGON DESIGN

SEMI-Ellipse Design

SEMI-Ellipsoid Flipped

Solid
A series of connectors and flexible joints were designed and prototyped during this project. The initial designs for the flex joints is shown in Figure A to the right and were intended to be door to wall connections. The idea behind the initial design (top left) was that it needed a way to connect to the wall and door while still functioning as a hinge. The first design failed due to lack of rigidity as the hinge just deformed when used. The next design had support material designed in to keep the structure rigid when flexing. The following iterations were redesigned to be much smaller and to integrate the connection to the wall and door into the design instead of just sliding the hinge over each side. Figure C shows this as the design became much smaller and more efficient than its larger predecessors. Throughout the design process a second style of connector was design which was a ball and socket style connection shown in Figure D. This connector allows for the door to stay open whereas the previous designs return to their original state once pressure is removed from them.
The first design chosen is very similar to the initial shotgun design with added porches and an entry way in the middle of the structure. The floor plan from the initial design was utilized, but modifications were made to provide a more functional layout while keeping the public and private areas separate. This design has a total of five modules. This left half is divided into two modules, one for the kitchen (1) and one for the living and dining rooms (2). The enclosed porch is its own module and would be considered as an add-on which would be selected by the client. The living room module, when printed, would be an empty shell as furniture would not have to be printed in place, but could be, making this module the simplest one to be fabricated. The kitchen module is a lot more detailed with cabinetry and counter tops. The doors and drawers of the casework would be printed separately and then attached during assembly. The bathroom is in the kitchen module and will have the bathtub and vanity printed in and the toilet will have to be added later on. The third module is the entry, which also includes the hallway and a mechanical/storage closet. This module is a basic shell, including only walls, floors, and a doorway to the closet. Printing the doorways on their side does create an issue as the printer has to bridge the opening once it reaches the top side. A solution to this would be to use a support piece once the print is to this step to allow the material to span shorter gaps in order to eliminate sagging. The last two modules encompass the two bedrooms. The fourth and fifth modules are the bedrooms.
The second chosen design consists of a series of modules shifted to create outdoor pockets and patio areas. This design, shown in Figure 6.13, uses four modules to make up the overall structure. The breakdown of each of the modules is shown in Figure 6.14. The entry module houses the living area along with a storage closet. The kitchen and dining room module is to the right of the living room. The kitchen is treated the same as in the last with the cabinetry and counters printed into the module. Appliances would be installed later. The third module includes the first bedroom along with the mechanical room. The final module is the second bedroom and the bathroom which, once again, will have the bathtub printed in place. The potential errors in printing these modules are nearly identical to the issues in the first design of spanning gaps and sagging. Similar means of using supports to help prevent the sagging will be used when printing these modules as well. In order to connect these walls together, a joining wall is needed between each of the modules. The need for this arises out of the fact that the modules are shifted thus not allowing the wall structure to line up to connect them in a similar manner to the first design. The joining wall will have the same voids in order to use the couplers, discussed in the next section, to link them together.